

REMARKS

Claims 1, 6-15, 17, and 20-26 are pending. Claims 2-5, 16, 18 and 19 have been canceled. No claims have been allowed.

Applicants have corrected paragraph [0036] of the specification to replace the term "expansion volume" with "resonance volume". The fact that the term "expansion volume" is incorrect and should be "resonance volume" is evident by considering paragraphs [0009], [0036] and [0041] of the specification as filed together.

The Examiner rejected Claims 1, 2-4, 8-11, 13-20, 22 and 26 under 35 U.S.C. §103 as being obvious over U.S. Patent No. 6,305,493 to Laimbock ("Laimbock '493") in view of U.S. Patent No. 4,165,789 to Martinez ("Martinez '789"), and rejected Claims 7-12, 21 and 23-25 under 35 U.S.C. §103 as being obvious over Laimbock '493 in view of U.S. Patent No. 6,076,632 to Schuhmacher et al. ("Schuhmacher et al. '632").

Laimbock '493 discloses a muffler, shown in Fig. 1, in which exhaust gases enter inlet 28 and pass through inlet line 29 to connection piece 30. Thereafter, the exhaust gases pass through inlet part 18 before being split and pass through two deflection arcs 10 and 11 which are each provided with an angle of deflection of $180^\circ \pm 30^\circ$. The gases then pass through diffusers 4 and 5 having expanding cross-sectional areas before passing through deflection arcs 8 and 9 which have an angle of deflection of $180^\circ \pm 30^\circ$. Thereafter, the exhaust gases pass through counter cones 6 and 7 having narrowing cross-sectional areas before passing through deflection arcs 12 and 13 which are each provided with an angle of deflection of $180^\circ \pm 30^\circ$ before entering end part 19 and eventually exiting the muffler through outlet 33. In one embodiment, outlet 33 is omitted, and the exhaust gases pass through apertures 36 in reflection plate 35 into reflection chamber 37 before exiting the muffler through outlet opening 33a. (col. 4, line 65 through col. 5, line 5).

Martinez '798 discloses a muffler, shown in Fig. 2 thereof, in which exhaust gases enter first stage 1 through inlet 11 and travel through paths ABD and ACD of differing lengths to a common outlet 7 of first stage 1. Similar flows are repeated in second and third stages 2 and 3 before the exhaust gases exit outlet 10 of cover 5. Stages 1, 2, and 3 and cover 5 are formed of stamped metal plates.

Schuhmacher et al. '632 was cited for its disclosure of a muffler including pipe 94, shown in Fig. 4, which extends through second shell 16 and baffle members 18 and 20 into first shell 14.

Amended independent Claims 1 and 15 call for a muffler, and a combination of a small engine and a muffler, respectively, the muffler including, *inter alia*, a housing having an inlet and an outlet, a first passage and a second passage, each of the first and second passages curved through an angle of at least 270° and having a substantially constant cross sectional area. As shown in Figs. 3-6 of the present application, first and second passages 110 and 120 of muffler 50 are each curved through an angle of at least 270° and have a substantially constant cross sectional area.

By contrast, in the muffler of Laimbock '493, each of the sets of deflection arcs 8 and 9, 10 and 11, and 12 and 13, although appearing to each have a substantially constant cross-sectional area, are curved only through an angle of deflection of $180^\circ \pm 30^\circ$, *i.e.*, through a maximum angle of deflection of 210°. The foregoing deflection arcs 8 and 9, 10 and 11, and 12 and 13 cannot be conceptually combined with one another to result in exhaust passages having greater angles of deflection without also encompassing their connecting diffusers 4, 5 and/or countercones 6, 7, which have increasing and decreasing cross sectional areas, respectively, and not substantially constant cross sectional areas.

Thus, the muffler of Laimbock '493 fails to disclose first and second passages curved through an angle of at least 270° and having substantially constant cross sectional areas, as called for in amended independent Claims 1 and 15, and one of ordinary skill in the art would not modify the muffler of Laimbock '493 to include such features without deviating from the fundamental teachings of Laimbock '493.

Amended independent Claim 9 calls for a muffler for a small internal combustion engine, including, *inter alia*, a housing having an inlet and an outlet, an exhaust flow path, and at least one closed-end resonance chamber in fluid communication with the exhaust flow path proximate the outlet. As best shown in Fig. 6 of the present application, muffler 50 includes at least one closed-end resonance chamber or volume 128 and/or 130 in fluid communication with the exhaust flow path proximate outlet 90 of muffler 50. As discussed in paragraphs [0036] and [0041] of the specification as filed, resonance chambers 120 and 130 trap high frequency waves associated with exhaust gases such that same may resonate within the volumes, loosing their energy to thereby reduce high frequency noises with the exhaust gases.

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Laimbock '493, Martinez '798, and Schuhmacher et al. '632 each fail to disclose mufflers having at least one closed-end resonance chamber in fluid communication with an exhaust path proximate an outlet of the muffler. Rather, the entirety of the volumes of the mufflers disclosed in Laimbock '493, Martinez '798, and Schuhmacher et al. '632 comprise part of the through flow path of the exhaust gases through the mufflers, and therefore do not include closed-ended resonance chambers. As discussed above, in an alternate embodiment disclosed in Laimbock '493, reflection chamber 37 thereof is a flow-through chamber through which exhaust gases flow prior to exiting outlet 33a, and is not a closed-ended resonance chamber. (See Laimbock '493 at col. 4, line 65 through col. 5, line 5).

Amended independent Claim 23 call for a muffler including, *inter alia*, a first shell including an exhaust inlet, a second shell including an exhaust outlet, and an expansion volume defined by the first and second shells and disposed proximate the inlet.

The muffler of Laimbock '493 does not include an expansion volume defined by first and second shells and disposed proximate the muffler inlet. By contrast, referring to Fig. 1 of Laimbock '493, the muffler includes inlet line 29 "connected to the connection piece 30 of the diffuser insert 23, thus allowing the exhaust gases to travel further through the inlet part 18, the second deflection arcs 10, 11, and into the diffusers 4, 5". (col. 4, lines 24-27). Referring additionally to Fig. 3, inlet line 29 of the muffler of Fig. 1 corresponds to the inlet pipe 55 of the prior art muffler, and has a length sized to allow the diffuser and the countercones to be located downstream of the muffler inlet to reflect exhaust pressure waves back to the engine cylinder for scavenging at the correct point in the engine's timing sequence as discussed at col. 1, lines 5-24. For this reason, one of ordinary skill in the art would not modify the muffler of Laimbock '493 to include an expansion chamber proximate the inlet of the muffler, as same would allow exhaust gases to expand at an incorrect point in the engine's timing sequence.

For the foregoing reasons, Applicants respectfully submit that amended independent Claims 1, 9, 15, and 23, and the claims depending therefrom, are patentable over the references applied by the Examiner and are in condition for allowance.

It is believed that the above represents a complete response to the Official Action and reconsideration is requested. Specifically, Applicants respectfully submit that the application is in condition for allowance and respectfully request allowance thereof.

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In the event Applicants have overlooked the need for an additional extension of time, payment of fee, or additional payment of fee, Applicants hereby petition therefore and authorize that any charges be made to Deposit Account No. 02-0385, Baker & Daniels.

Should the Examiner have any further questions regarding any of the foregoing, he is respectfully invited to telephone the undersigned at (260) 424-8000.

Respectfully submitted,



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I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on: September 20, 2006

ADAM F. COX, REG. NO. 46,644

Name of Registered Representative



Signature

September 20, 2006

Date